The impact of inter-industry wage differentials on corruption and red tape: New firm-based evidence

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ABSTRACT

This paper examines how inter-industry wage differentials affect corruption and red tape at the firm level using data for 43,568 firms from 52 countries. Both perception-based and experience-based measures of corruption and red tape are considered. Data on wage differentials come from a new database that adopts micro-surveys as the underlying data sources. We find strong evidence that managers of high-wage firms in relatively poor countries perceive more corruption, face more red tape and spend more on bribes. These results are consistent with our hypothesis that corruptible government bureaucrats utilize the information on inter-industry wage differentials to target high-wage firms to extract bribes.

1. Introduction

Corruption is one of the most severe obstacles for firms' operations in many countries. Still, firms within the same country - which therefore share the same institutional environment - often pay different amounts of bribes and have different perceptions as to whether corruption is an obstacle to their operation. Several explanations have been suggested in the literature. Svensson (2003) argues that government bureaucrats act as price discriminators and determine the price of public services in a discretionary manner to maximize their income from corruption. More profitable firms are targeted and have to pay a larger amount of money on bribery. Another explanation for

why firms face different levels of corruption is that firms in less competitive industries are forced to pay more bribes because corruptible bureaucrats know the distribution of the monopoly rents (Bliss and DiTella, 1997). Finally, Alexeev and Song (2013) argue that competition induces more corruption because firms have to compete with each other for the distribution of public services.

Red tape, defined as completely pointless bureaucratic procedures that one has to endure when dealing with the bureaucracy (Banerjee, 1997), is another equally severe problem in many countries. It is the result of government (over-)regulation and is often abused by corrupted officials as a means to corrupt. Red tape creates burdens on the firms' operations and forces them to pay bribes. Corruptible government officials have an incentive to create red tape by making regulatory compliance artificially more costly or public services artificially scarcer in order to extract further bribes (Rose-Ackerman, 2004). Guriev (2004) shows that corruption leads to a level of red tape that is higher than the socially optimal level, while Banerjee (1997) demonstrates that red tape is deliberately created by bureaucrats in order to make money, and that the level of red tape is higher in relatively poor countries. Kaufmann (1997) finds that firms that spend more on bribery also face more red tape.

This paper investigates the impact of wage differences across industries and countries on red tape and corruption. As explanatory variable, we will use the ratio of government wages and the average wages in each of the industries that are considered. This is because the relative government wages are hypothesized to be the cause of corruption and determine which industry is targeted. Previous studies, such as Van Rijckeghem and Weder (2001), Dutt (2009), and Le et al. (2013a), have used relative government wages that were defined as the ratio of government wages to the wages in the manufacturing industry. Such measure captures the relative wages of government employees while it helps avoiding the difficulty of comparing absolute values of wages across countries. However, it focuses on the manufacturing industry only and ignores that the wage gap (and thus the incentive to corrupt) may differ across industries. In this paper we therefore focus on all industries classified according to the International Standard Industrial Classification of All Economic Activities, revision 3 (ISIC 3). Our relative government wage indicator (defined as the ratio of government wages and the average wages of each of the ISIC 3 industry) thus varies from one industry to the other. The higher the wages of an industry are, the lower the value of the relative government wage indicator is. The indicator thus reflects the industry wage differentials in each country.

A large body of literature finds that industrial wage differences within a country are driven by the profitability of the firms within an industry (Krueger and Summers, 1988; Gittleman and Wolff, 1993; Genre et al., 2011). On the other hand, firm-level studies have found that government bureaucrats and politicians act as price-discriminators in terms of bribery bargaining (Svensson, 2003). As a result, corrupt bureaucrats may consider inter-industry wage differentials as information in deciding which firms to target. When inter-industry wage differentials serve as a channel of information for the opportunities to extract bribes, the bureaucrats will have the incentive to "rattle" the firms that they think are most capable of paying bribes. That is, firms in an industry with relatively high wages and, therefore, a low relative government wage indicator.

The measures of corruption and red tape in this study are both perception-based and experience-based. The data are collected via worldwide surveys at the firm level, carried out by the World Bank's Enterprise Survey Unit. The perception-based measures are the responses by top managers to questions about how much of an obstacle government regulations and corruption are to the firms' day-to-day operations. The experience-based measures are the actual amount of "unofficial payment" that top managers think "firms like theirs" have to pay government officials to "get things done", and the time devoted to dealing with government procedures by senior managers. The database covers a large number of firms from mostly developing countries. The surveyed firms are representative of an economy's private sector and can be classified into ISIC 3 industries. The sample used consists of 43,568 firms from 52 countries.

We test our hypothesis that firms from high-wage industries face more corruption and red tape by modeling red tape and corruption as nonlinear functions of the relative wage indicator and an interaction term between this indicator and the level of income per capita. By including the interaction term, the impact of inter-industry wage differentials is moderated by the level of income per capita. The interaction term accounts for the theoretical prediction of Banerjee (1997) that the level of red tape is higher in relatively poor countries. It is also motivated by the finding of Le et al. (2013a) that relative government wages are more strongly related to corruption in low-income countries than in high-income countries. The explanation given is that higher government wages only reduce petty corruption (which involves small amounts of money), a phenomenon that is common, in particular, at low levels of economic development. Built on these findings, the relationship between our indicator of relative government wages, and red tape and corruption is

expected to be negative in low-income countries, i.e. firms from higher-wage industries, thus having a lower indicator, face more red tape and spend more on bribes.

However, petty corruption is less common in rich countries in which bureaucrats are also less likely to use red tape as a measure to rattle firms in order to extract bribes. Therefore, we expect no relationship between inter-industry wage differentials and corruption when the income level is relatively high. Furthermore, high-wage firms are often more profitable and therefore have enough resources to meet costly government regulations. As a result, they are less likely to complain about government regulations. Therefore, the relationship between relative government wages and red tape may be positive in relatively rich countries, i.e. high wage firms complain less about government regulation.

We use several econometric models and control for country and time specific effects as well as firm-level characteristics. In low-income countries, we find strong evidence that top managers in high-wage industries (when compared to those low-wage industries) are more likely to view government regulations and corruption as obstacles to their firms' operations. Such high-wage firms pay a larger amount of their annual sales on corruption and their senior management also spends significantly more time on dealing with government regulations.

The paper will proceed as follows. Section 2 presents our motivation to explore the relationship between inter-industry wage differentials and corruption and red tape. Section 3 presents the econometric models and data sources. The findings are presented in section 4 while Section 5 concludes.

2. Related literature and motivation

The most important line of research related to this study deals with the relationship between government wages and corruption, which can be defined as the abuse of public office for private gain (Rose-Ackerman, 2004). A major reason for government bureaucrats to involve in corruption is that their wages are so low that they have to "abuse" their power to meet the subsistence level (Klitgaard, 1989; Stasavage, 1999; Feinberg, 2009). A natural question is whether raising government wages will eradicate, or at least reduce, corruption. Several theoretical studies such as Becker and Stigler (1974), UlHaque and Sahay (1996), Van Rijckeghem and Weder (2001), Bose (2004) and Bond (2008) suggest that this is the case. Higher government wages make government bureaucrats feel being fairly treated and they may withhold from corrupt activities which would

reduce corruption. Selfish government employees who aim at maximizing their income may also find it no longer optimal to corrupt because higher wages increase the economic loss of losing a well-paid government job in case of detection. Finally, higher government wages will attract better workers to the government and prevent high-quality government employees from moving to the private sector. The quality of the bureaucracy will then improve and the government may become better at controlling corruption.[1]

Some empirical studies find that higher government wages reduce corruption (Van Rijckeghem and Weder, 2001; Dutt, 2009) while some others report no significant relationship between government wages and corruption (Panizza, 2001; Treisman, 2007). In these studies relative government wages are generally defined as the ratio of government wages and the wages of a benchmark sector, such as manufacturing. Alternatively, GDP per capita may be used as the denominator. This practice dates back to the seminal research by Heller and Tait (1984). In a recent study covering a large number of countries over the late 1980s-2010 period and using data drawn from micro-based surveys, Le et al. (2013a) find that government wages only have a negative impact on corruption in countries with a relatively low income per capita. Their explanation is that corruption in poor countries mainly consists of petty corruption which government bureaucrats in high income countries are more likely to forgo because the relatively small amount of money gained may not be worth the effort.[2] Also, petty corruption is easier to detect and government employees in relatively rich countries may not find the gains worth the risk of detection.

There are several reasons why inter-industry wage differentials may be related to the level of red tape and corruption. First, the inter-industry wage structure is partly determined by the profitability of each industry (Lawrence, 1986; Du Caju et al., 2010). Studies in the last decades also find that the structure is relatively stable over time in both developed and developing countries (Erdil and Yetkiner, 2001), even in the face of major macroeconomic shocks (Arbache et al., 2004). Therefore, the differences in relative government wages across industries may serve as a signal about the profitability of firms. Selfish government agents who aim to maximize their income may use this information to screen and filter out firms which are most capable of paying bribes. Once certain groups of firms are targeted, bureaucrats can use their discretionary power to increase red

[1] At the same time, studies such as Besley and McLaren (1993) and Macchiavello (2008) argue that paying high government wages to combat corruption is very costly or inefficient.

[2] Examples of petty corruption are road bribery and public fund embezzlement as documented in Bardhan (2006) and Akombi (2009).

tape in order to extract bribes. So firms in high-wage industries will face more red tape and may have to buy their way out via corruption.

Second, the fair-wage hypothesis suggests that government bureaucrats forgo opportunities to extract bribes once they are paid a wage level they perceive as fair. However, the feeling of being fairly paid is a subjective matter and whether or not a bureaucrat feels that he is fairly paid may depend on the reference (Mas, 2006). A similar issue has been discussed in the literature on happiness. Based on a survey of this literature, Clark et al. (2008) conclude that individuals feel happier when their income is relatively higher than the income of comparable people. In another study, Clark et al. (2010) report that workers who receive an income at the higher end of the relevant income distribution also exert more effort to fulfill their duty. These results suggest that bureaucrats may feel less guilty if they extract bribes from firms in high-wage industries.

Third, government employees may differ in terms of motivation (Macchiavello, 2008). Some may be highly motivated to work for the government and serve the society. However, others may choose to work for the government because of the possibility to corrupt. The latter type of bureaucrats will also seek to work for those government agencies offering the best opportunities to extract bribes. Therefore, selfish government employees are more likely to regulate high-wage industries, because the profitability of such industries might be a good signal that firms are able to pay bribes. As a result, firms in high-wage industries may face more red tape and spend more on bribery.

3. Data and the estimation approach

3.1 The World Bank's Enterprise Survey

The Enterprise Survey database[3] focuses on a wide range of issues, such as infrastructure services, sales and supplies, and business-government relationships. We focus on two different sets of questions. The first one aims at capturing the top managers' perceptions of dealing with the government, and the other set of questions aims at measuring the actual cost of corruption and red tape that firms incur. With respect to the perception measures, top managers are asked to judge how much of an obstacle corruption and government regulations are to their firms' day-to-day operations. Besides a question on general corruption, there are four questions on the extent to

[3] Available at http://www.enterprisesurveys.org/

which labor regulation, courts/legal system, business licensing and operating permits, and tax administration are obstacles to the firm's operations.[4] So we have one perception-based measure of corruption and four perception-based measures of red tape. The actual cost of corruption is obtained from top managers' response to the question how much gifts and informal pay, in terms of annual sales, firms like theirs have to pay "to get things done". Finally, the actual cost of red tape is measured as the reported percentage of their time that senior management spent on dealing with government regulations.

Each type of measurement has some advantages but also suffers from shortcomings. While the top managers are likely to answer questions on their perceptions, their responses may be biased toward their most recent experience with the government (Kaplan and Pathania, 2010). Managers may not find that labor regulations are burdensome if no government inspector visited their firm recently, while others may perceive that obtaining an operating permit is very difficult because they recently faced that problem. Perception measures are subjective and it is difficult to know whether perceptions reflect the actual situation or not.

With respect to the experience-based measures, the question on the actual amount of corruption gives us a very concrete measure of the cost of corruption but many managers refuse to answer such questions or give a false response because they are afraid of retaliation (Jensen et al., 2010). The measure of actual red tape stands out to be the most reliable because it is comparable between firms and it is less sensitive than the question on corruption so that respondents are more likely to give true answers.

[Table 1 is to be inserted here]

Table 1 presents the name of the dependent variables as well as their corresponding survey questions. For the questions regarding top managers' perceptions of government regulation, the resulting variables are categorical, running from 0 to 4, where higher values indicate more obstacles. The experience-based variables are continuous. $Corruption\ cost$ is the reported percentage of annual sales spent on corruption, while $Red\ tape\ cost$ is the reported percentage of senior management's time spent on dealing with government regulations.

[4] Another aspect of red tape are customs and trade regulations, which turned out to be insignificant. Perhaps, this is because only 23% of the sampled firms in our analysis export directly or indirectly, while 77% of the firms do not have any experience with customs regulations. Results are available on request.

Banerjee (1997), Bose (2004) and Guriev (2004) suggest that these measures are inter-related. To extract petty bribes, corrupt bureaucrats may raise the level of red tape. Artificially high levels of red tape require top managers from high-wage firms to spend more time on dealing with government regulations and they will find government regulations a severe obstacle to their firm's operations. Consequently, firms have to pay more bribes to overcome the red tape and their top managers will also report higher bribery expenditure percentages.

3.2 The empirical model

Given the differences in the nature of the dependent variables in our study, we employ two different econometric methods to estimate the relationship between inter-industry wage differentials and corruption and red tape, namely the Ordered Probit model, and the Tobit model. First, we model the managers' perceptions of each aspect of government regulation as a latent variable, y_n^*, which is a function of our variable of interest and a set of control variables of the following form:

$$y_{nijkt}^* = \beta_n WAGE_{ijt} + \delta_n\left(WAGE_{ijt} \times INCOME_{it}\right) + \rho_n X_{nijkt} + \sigma_n Z_{it} + \varepsilon_{nijkt} \qquad (1)$$

where y_n^*, with $n\ (= 1, 2, .., 5)$, indicates the different dependent variables that are taken into consideration. That is, the top managers' perception of corruption and of the obstacles related to: the legal system, labor regulations, the business licensing and operating permits, and the tax administration. The indexes i, j, k and t stand for country, industry, firm and the surveyed year, respectively. As mentioned before, $WAGE_{ijt}$ is an indicator of relative government wages which is constructed as the ratio of government wages to the average wages of the industry that a firm is operating in. $INCOME_{it}$ gives the income, measured as the natural log of GDP per capita in 2012 PPP prices. X_{ijkt} is a set of firm-level control variables and ε_{nijkt} is the error term which is assumed to follow a standard normal distribution. Z_{it} represents country-year dummies. These dummies will take into account all differences between countries as well as the variation within each country over time. For this reason, we do not need to control for country-specific variables that potentially affect red tape and corruption.

The coefficient of $WAGE$ is expected to be negative for the reasons outlined in the previous section. The interaction term $WAGE_{ijt} \times INCOME_{it}$ is the product of the relative government

wage indicator and the income variable. This interaction term is included in our model to capture the fact that bureaucrats in poor countries are more likely to use the relative wage information to target high-wage firms to extract petty bribes than bureaucrats in rich countries (Le et al., 2013a). It is also consistent with the theoretical prediction in Banerjee (1997) that red tape is more likely to be abused as a means to extract illegal income in poor countries. We expect the marginal impact of $WAGE$ on y_n^* to be negative at low-income levels. When the income level is relatively high, we do not expect any significant relationship between inter-industry wage differentials and corruption because petty corruption is not common in rich countries. However, the impact of $WAGE$ on the top managers' perception on government regulation in rich countries can be positive because high wage firms are often more profitable and have enough resources to meet the costly regulations and rules.

In practice, we do not observe y_n^* directly. Instead, we have the categorical variable, y_n, which is the response by top managers to the first 5 questions listed in Table 1. These categorical responses are determined by the underlying continuous variable y_n^*. The observed categorical variable will take the value l, $(l = 0, 1, 2, 3, 4)$, if:

$$\mu_{nl-1} \leq y_n^* < \mu_{nl}$$

where $\mu_{n-1} = -\infty$ and $\mu_{n4} = +\infty$. Let $A \equiv \{\beta_n WAGE_{ijt} + \delta_n(WAGE_{ijt} \times INCOME_{it}) + \rho_n X_{nijkt} + \sigma_n Z_{it}\}$, then the coefficients $\beta_n$and δ_n in equation (1) can be estimated in a consistent manner by using the Ordered Probit model of the following form (Cameron and Trivedi, 2005):

$$\begin{aligned} P[y_n = l] &= P[\mu_{nl-1} \leq y_n^* \leq \mu_{nl}] \\ &= P[\mu_{nl-1} \leq A + \varepsilon_{nijkt} \leq \mu_{nl}] \\ &= P[\mu_{nl-1} - A \leq \varepsilon_{nijkt} \leq \mu_{nl} - A] \\ &= \Phi[\mu_{nl} - A] - \Phi[\mu_{nl-1} - A] \end{aligned}$$

Two special cases are $y_n = 0$ and $y_n = 4$. The probability that y_n takes the value of 0 can be simplified as:

$$P[y_n = 0] = P[-\infty \leq y_n^* \leq \mu_{n0}]$$

$$= P\left[A + \varepsilon_{nijkt} \leq \mu_{n0}\right]$$
$$= P\left[\varepsilon_{nijkt} \leq \mu_{n0} - A\right]$$
$$= \Phi[\mu_{n0} - A]$$

In a similar manner, the probability that $y_n = 4$ can be written as:

$$\begin{aligned} P[y_n = 4] &= P[y_n^* \geq \mu_{n3}] \\ &= P\left[A + \varepsilon_{nijkt} \geq \mu_{n3}\right] \\ &= P\left[\varepsilon_{nijkt} \geq \mu_{n3} - A\right] \\ &= 1 - P\left[\varepsilon_{nijkt} \leq \mu_{n3} - A\right] \\ &= 1 - \Phi[\mu_{n3} - A] \end{aligned}$$

where Φ is the standard normal cumulative distribution of the error term ε_{nijkt}. The interested parameters of this model can be estimated using the maximum likelihood estimator, with the log likelihood function specified as:

$$ln\ell_n = \sum_{k=1}^{N} \sum_{l=0}^{4} v_{nl}\, ln\left[\Phi[\mu_{nl} - A] - \Phi[\mu_{nl-1} - A]\right]$$

where v_{nl} is a dummy variable which takes the value of 1 if a top manager reports that indicator n take the value l, $(l = 0, 1, 2, 3, 4)$, and N is the size of the sample of surveyed firms.

Second, we investigate the relationship between inter-industry wage differentials and the actual cost of corruption and red tape, i.e. the actual amount of revenue spent on corruption and the actual percentage of time that senior management spent on dealing with government regulations, by specifying a linear regression equation:

$$y_{mijkt}^* = \beta_m WAGE_{ijt} + \delta_m\left(WAGE_{ijt} \times INCOME_{it}\right) + \rho_m X_{mijkt} + \sigma_m Z_{it} + \varepsilon_{mijkt} \qquad (2)$$

where y_m^*, with $m = 1, 2$, stands for our measures of the actual cost of corruption and the actual cost of red tape respectively. ε_{mijkt} is the random error term which is assumed to follow a normal distribution. Other variables are defined as before.

One problem with the linear regression model in equation (2) is that we do not observe y_m^* directly. Instead, we observe a variable y_m which is equal to y_m^* if $y_m^* > 0$ and 0 if $y_m^* \leq 0$. In other words, the variables on the reported cost of corruption and red tape are censored from below at 0. Following Alexeev and Song (2013), we therefore employ the Tobit model which takes into account the probability that y_m^* is censored at 0 by adding a correction term to the log likelihood function of the ordinary least squares log likelihood function. The correction term is the probability that $y_m^* \leq 0$, which is (Cameron and Trivedi, 2005):

$$\begin{aligned} P[y_m = 0] &= P[y_m^* \leq 0] \\ &= P\left[B + \varepsilon_{mjkt} \leq 0\right] = P\left[\varepsilon_{mijkt} \leq -B\right] \\ &= P\left[\frac{\varepsilon_{mijkt}}{\sigma} \leq \frac{-B}{\sigma}\right] \\ &= \Phi\left[\frac{-B}{\sigma}\right] \\ &= 1 - \Phi\left[\frac{B}{\sigma}\right] \end{aligned}$$

where σ is the standard deviation of ε_{mijkt}, and $B \equiv \{\beta_m WAGE_{ijt} + \delta_m(WAGE_{ijt} \times INCOME_{it}) + \rho_m X_{mijkt} + \sigma_m Z_{it}\}$. β_m and δ_m in equation (2) can be estimated consistently by maximizing the likelihood function of the following form:

$$ln\ell_m = \sum_{y_m=0} ln\left\{1 - \Phi\left[\frac{B}{\sigma}\right]\right\} + + \sum_{y_m>0} ln\left\{\frac{1}{\sigma}\varphi\left[\frac{y_m - B}{\sigma}\right]\right\}$$

where φ is the density function of a standard normal random variable.

3.3 Control variables

An important question is which firm-level variables should be included in X_{nijkt} and X_{mijkt} in equations (1) and (2). Given the lack of a clear theory and the interrelatedness between the dependent variables, we have chosen to include the same set of variables in both equations. These variables aim at controlling for different firm characteristics to ensure that the estimated impact of government wages on corruption and red tape is not biased. Following previous studies such as Svensson (2003), Fan et al. (2009) and Alexeev and Song (2013), we include 6 groups of firm level characteristics as control variables. These are firm location, legal status, size, ownership, age, and export activity.

The location of a firm can affect its business opportunities as well as its profitability, which in turn will affect its ability and willingness to pay a bribe. Firms in more profitable locations, e.g. large cities, are also more likely to be targeted by government officials. We include three dummies to account for firms' location. $FIRMLOC1$, $FIRMLOC2$ and $FIRMLOC3$ take the value 1 if the firm is located in a city: with a population of $250{,}000$ to 1 million people, with a population of more than 1 million people or that is the capital city, respectively. With respect to a firm's legal status, there are also three dummies which take the value 1 if a firm has the legal status of privately limited ($FIRMLEGAL1$), publicly listed ($FIRMLEGAL2$), or sole proprietary ($FIRMLEGAL3$). Firms with different legal statuses are subject to different regulations on information disclosure and may, therefore, have different perceptions on, and experiences with, red tape and corruption.

Svensson (2003) argues that small firms are less likely to pay bribes because it is easier for them to escape attention from corruptible officials. To control for this, we include two dummies which equal 1 if the size of the firm in terms of employment is between 5 and 19 ($SMALL$) or between 20 and 99 ($MEDIUM$). International investors, especially those from OECD countries, face extra regulations on corruption from home country authorities. As a result, we expect that foreign direct investment (FDI) firms are less likely to bribe. Government ownership provides firms with connections to authorities or access to resources that private firms can only get by bribing. Hence, enterprises partly owned[5] by the state might face less red tape and can avoid some form of bribery faced by private firms. To take these considerations into account, we construct two

[5] 100% state-owned enterprises are excluded from the Enterprise Surveys.

dummies: $OWNERSHIP1$ which takes the value of 1 if a firm is an FDI enterprise, and $OWNERSHIP2$ which takes the value of 1 if the firm is partly owned by the government.

$FIRMAGE$ and $FIRMEXPORT$ are the final explanatory variables. $FIRMAGE$ is the number of years since a firm started operation while $FIRMEXPORT$ is a dummy variable which is equal to 1 if a firm sells its products abroad.[6] Because new firms typically face more procedures to deal with, they may complain more about red tape and may have to pay more bribes. Similarly, exporting firms have to use more public services and may therefore have worse perceptions of and experiences with the government.

3.4 Data sources and descriptive analysis

Data on wages are taken from the worldwide database on industrial wages collected by Le et al. (2013b). This database provides the average wages for each of the 17 ISIC 3 industries for 126 countries over the late 1980s – 2011 period. One part of the data is obtained from international household survey databases, such as the World Bank Living Standard Measurement Study, the Luxembourg Income Study, or the one from the International Labor Organization. The other part of the data is obtained by studying countries' data archives. Next to the fact that survey data are more accurate than macro data obtained from statistical yearbooks (Le et al., 2013c), they also open a new path to overcome the problem of missing data for developing countries, where reliable macro data on government wages and on employment are often lacking. We use data on wages for the public administration and the 9 industries that are included in the Enterprise Survey database.[7] The relative government wage indicator is defined as the ratio of the wages in public administration to the average wages of the ISIC 3 industry that a firm is operating in.

We first compute the relative government wages for all countries for which Le et al. (2013b) provides data. In the second step, this dataset is merged with the cleaned Enterprise Surveys dataset. We only retain firms with complete information on all explanatory variables and at least one dependent variable. The final sample consists of 43,568 firms from 52 countries.

[6] $FIRMAGE$ is divided by 100 so that the coefficient on $FIRMAGE$ does not become very small.

[7] The 9 industries included in the Enterprise Survey database are: Mining and quarrying; Manufacturing; Electricity, gas and water supply; Construction; Wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods; Hotels and restaurants; Transport, storage and communications; Financial intermediation; and Real estate, renting and business activities.

Table 2 presents summary statistics for the main variables in our models. The relative government wage indicator varies between 0.2 and 3.16, with an average value of 1.49. There is also substantial variation in the perceptions of top managers on different aspects of government regulation. The average corruption perception score is about 1.55. Perception on tax administration has an average of 1.52, but the average scores on the extent to which business licensing and operating permits, labor regulation and the legal system are obstacles for firms' operations are only 1.12, 1.19 and 1.22, respectively. The response rate[8] to the questions regarding top managers' perception on corruption and red tape is always higher than 90%.

[Table 2 is to be inserted here]

With respect to the actual cost of red tape, the response rate is also high, equal to 93.30%. About 31% of the respondents in our retained sample report that they spend no time on dealing with government regulation, while only 2% report that they spend more than 50% of their time on the issue. On average, senior managers who report a positive amount of time dealing with the government spend about 14.70% of their time on the issue, while the variation between these firms is relatively large, with a standard deviation of about 17.05%.

With respect to the actual cost of corruption, firms reporting to pay bribes indicate that they have to incur about 3.99% of their annual sales "to get things done". There is substantial variation in the amount that firms pay, from about 0.001% to 100%, and the standard deviation of this variable is 6.44%. Most firms reporting a positive amount of bribery indicate that they have to pay an amount of about 10% or less and only 1% of the responding firms report that they have to pay more than 10%. However, we should emphasize that 35.07% of the surveyed firms refuse to answer this question. In our retained sample, only 28,300 out of 43,568 firms respond (equal to 64.96%) and only 7,952 firms report a positive amount of expenditure on bribes (equal to 18.25%). And, managers who answer may intentionally give the wrong information (Kraay and Murrell, 2013). The measurement of actual corruption cost is therefore probably the least reliable of our 7 measures used.

[8] The response rate in this section is calculated based on the original sample, before the observations with missing information are dropped.

Table 3 presents the correlation between the main variables of our models. The correlation between $WAGE$ and the interaction term $WAGE \times INCOME$ is very high, equal to 0.96. This is because the variable $INCOME$, measured in natural logs, does not vary very much in our sample. The correlation between the variables capturing the top managers' perception of corruption and the extent to which regulation is regarded as an obstacle is relatively low. Also the correlation between actual corruption cost and top managers' perception of corruption and red tape is very low, varying from 0.02 to 0.16, suggesting the importance of studying the issue from different angles.

[Table 3 is to be inserted here]

Another important result is that the correlation between $INCOME$ and different measures of corruption and red tape, presented in column (2) of Table 3, are mostly negative but relatively low. This is very different from the high correlation between $INCOME$ and measures of corruption and red tape at the country level as generally reported in the literature. Such difference suggests that there is a substantial variation of corruption and red tape facing firms within a country that cannot be captured by aggregate corruption measures.

4. Results

4.1 The relationship between inter-industry wage differentials and perceptions of corruption and red tape

Table 4 presents the estimation results for equation (1). The heading of each column shows the dependent variable. So, column (2) shows the relationship between inter-industry wage differentials and top managers' general perceptions of corruption, column (3) shows the relationship between wage differentials and top managers' perceptions of obstacles in the legal system, and so on. The number of observations in each column differs due to data availability. The largest number of observations is 42,842 for the model for perceptions on labor regulations. The smallest sample is 39,470 for the model on perceptions of the legal system.

The signs of the coefficients of our variables of interest, namely $WAGE$ and $WAGE \times INCOME$, show a very clear pattern across different models in Table 4. The coefficient of $WAGE$ is always negative. The coefficient of $WAGE \times INCOME$ is always positive and is about 10 times

smaller than that of $WAGE$. These results support our hypothesis that, in low-income countries, top managers of firms in high-wage industries find it more burdensome to deal with government regulation than top managers of firms in low-wage industries.

[Table 4 is to be inserted here]

However, due to the interaction effects the marginal impact of $WAGE$ cannot be discerned directly from the magnitude of the two terms (Brambor et al., 2006). For this reason, we compute the marginal effect of $WAGE$ as:

$$\frac{\partial y_n^*}{\partial WAGE} = \beta_n + \delta_n \times INCOME$$

Next, the 95% confidence intervals of these marginal effects are computed. In Figure 1, we graph the marginal effects (together with their 95% confidence intervals) for the case of the top managers' perceptions on general corruption and the legal system. Similar figures for the perceptions related to labor regulation, business licensing and operating permits, and tax administration are included in Appendix B. In all figures the marginal impact of $WAGE$ on the respective dependent variable is on the vertical axis while the horizontal axis presents the level of income per capita.

[Figure 1 is to be inserted here]

Figure 1 suggests that top managers of firms in high-wage industries are more likely to perceive corruption and regulations as an obstacle to their firms' operations in low-income countries than in high-income countries. Consistent with the estimation results in Table 4, the marginal impact of $WAGE$ on each of the dependent variables is negative when the income level of the country is relatively low. The negative impact reduces and eventually becomes positive as the level of income per capita rises. The negative marginal impact of $WAGE$ is only significant when income per capita is lower than a certain threshold, which is explicitly noted in the top left of each graph. For example, the marginal impact of $WAGE$ on top managers' perception of corruption is only significant if income per capita is 8,602 dollars or lower. The corresponding

income level for the perception of the extent to which the legal system is an obstacle is 12,785 dollars. The same pattern applies for perceptions related to labor regulation, business licensing and operating permits, and tax administration (see Appendix B). The corresponding numbers for these cases are: 9,385 6,432; and 5,605 dollars.

There is no significant relationship between $WAGE$ and the top managers' perceptions of corruption and the legal system as an obstacle when the income level is higher than 8,602 and 12,785 dollars, respectively. This finding supports our expectation that high-wage firms are not targeted by corruptible bureaucrats in the richer countries, because corruptible bureaucrats in these countries do not have the incentive to harass the high-wage firms to extract petty bribes. Note, however, that the impacts of $WAGE$ on the perceptions of labor regulation, business licensing and operation permits, and tax administration are positive and significantly different from zero when the income level is higher than 22,584; 28,917; and 12,090 dollars, respectively. This finding is in line with our expectation that in relatively rich countries high-wage firms are more likely to be able to meet the costly government regulations. Therefore, top-managers of high-wage firms in relatively rich countries consider labor regulation, business licensing and operation permits, and tax administration less of an obstacle to their firms' operations than do top managers of low-wage firms (in the same country).

4.2 The relationship between inter-industry wage differentials and the actual costs of corruption and red tape

Table 5 presents the estimation results for equation (2). Columns (2) and (3) are the estimates for the actual costs of corruption, while columns (4) and (5) present the estimates for the costs of red tape. Following Alexeev and Song (2013), we first estimate the models when we only put a lower limit of zero to the dependent variables. Next, we impose some upper limit to both dependent variables because some top managers report unusually high costs. For example, most respondents report that their firms spend less than 10% of annual sales on corruption, but few respondents report a (sometimes much) higher percentage, even up to 100% of annual sales. The same is true for the reported costs of red tape. Most managers indicate that they spend less than 50% of their time on dealing with government regulations. Observations with unusually high numbers can be influential and may distort the estimation results. For this reason, we impose an upper limit of 10.01% for the costs of corruption (column 3) and 50.01% for the costs of red tape (column 5).

[Table 5 is to be inserted here]

The findings reported in Table 5 are similar to those of Table 4. The coefficient of $WAGE$ is negative while the coefficient of $WAGE \times INCOME$ is postive, and about 10 times smaller in magnitude. The coefficient of $WAGE$ is significant at the 10% level when the dependent variable is corruption costs and significant at the 5% level in the case of red tape. The coefficient of $WAGE \times INCOME$ is significant at the 10% level in three out of four regressions. When the upper limit is imposed, both coefficients become smaller, supporting our argument that it is necessary to correct for the cases of unusually high reported costs of corruption and red tape.

The results in Table 5 indicate that the impact of $WAGE$ is moderated by income per capita. From equation (2), the marginal impact of $WAGE$ on $Corruption\ cost$ and $Red\ tape\ cost$ can be computed as:

$$\frac{\partial y_m^*}{\partial WAGE} = \beta_m + \delta_m \times INCOME$$

Again, we compute the marginal impacts and their 95% confidence intervals for the models in columns (3) and (5) of Table 5 and graph the results in Figure 2. As before, the vertical axis represents the impact of $WAGE$ on the costs of corruption and red tape when $WAGE$ increases by one unit. The horizontal axis shows the level of income per capita. Figure 2 shows that the marginal impact of $WAGE$ on firms' corruption expenditure is negative and significant at the 5% level when income per capita is about 6,121 dollars or lower. Above this income level, no significant result can be established. The corresponding number in the case of red tape is 14,744 dollars.

[Figure 2 is to be inserted here]

These results show that managers of high-wage firms spend more time on dealing with the government and also to pay a larger amount "to get things done". However, the effects are statistically significant in low-income countries only. With respect to the size of the effects, take, for example, two industries in a country with an income level of about 3,000 dollars (equivalent to 8 in natural logs). In the case of corruption in column (3), we have that $\partial y_m^*/\partial WAGE = -0.7$. If the wage level of one industry is about 10% higher than the wage level of the other industry,

firms in the former have to pay an extra amount of about 0.07% of their annual sales on corruption. At the same time, their senior managers spend about 0.35% more of their time on dealing with government regulations.

4.3 The impact of other variables

A general pattern across the models in Tables 4 and 5 is that firm age, government ownership and foreign ownership are associated with less negative perceptions of corruption and government regulations, and lower spending on corruption. In comparison with large firms, small and medium-sized firms have less negative perceptions of corruption and red tape but they have to pay a significantly larger amount of annual sales on corruption. The group of variables on the firms' legal status appear to be less significant determinants of corruption perceptions, time spent on red tape, and corruption expenditures. Only firms with the sole propriety legal status report better perception of government regulations, spend less time on dealing with government regulations and, to some extent, pay less bribes.

There is strong evidence that firms located in capital cities pay more bribes and have worse perceptions of corruption and government red tape. Finally, exporting firms report mixed results on corruption and regulation perceptions, red tape cost and bribery expenditure. There is no evidence that these firms pay more bribes or have worse perceptions of general corruption. However, they appear to have worse perceptions of government regulations and spend more time on dealing with government regulations. Perhaps, this is because exporting firms have to deal with these aspects of the government more frequently.

4.3 Robustness checks

Our results thus far indicate that managers of firms in high-wage industries in low-income countries have worse perceptions of corruption and government regulations as obstacles to run their firms, spend more time on dealing with government regulations, and pay a larger share of annual sales on corruption. The results in Table 4 and 5 thus lend support to our hypothesis that corrupt government officials in low-income countries use wage differentials as an indicator to target firms to extract bribes.

However, one alternative explanation to this finding might be that high-wage industries are highly concentrated industries. According to Alexeev and Song (2013), corruption happens when

corruptible government bureaucrats collude with firms to share the rent. When concentration is high and competition for public services is low, firms have to spend less on bribery. However, when concentration is low and competition is high, more firms compete for public services and they have to spend more on bribery (Alexeev and Song, 2013).

Following Alexeev and Song (2013) we compute the Herfindahl-Hirschman index (HHI), which is a conventional measure of industry concentration and has been used frequently to measure competition at the industry level.[9] This index is defined as the sum of squares of the ratio of the respondent firm's sales to total sales in the respondent firm's industry. To reflect market power of firms, it is better to define the industries at a finer level than the ISIC 3 one-digit level. For this reason, the HHI is calculated for the ISIC 3 two-digit level industries. Higher values of the HHI are associated with more concentration, and thus weaker competition.

We estimate the models in equation (1) and add HHI into X_{nijkt}. The results are reported in Table 6. The results suggest that our findings are not affected by the inclusion of HHI. All coefficients, including those of $WAGE$ and $WAGE \times INCOME$, remain almost the same. The coefficient of HHI is only negative and significantly different from zero when perception on labor regulations is the dependent variable. In the other models the coefficient of HHI is not significantly different from zero at conventional levels.

[Table 6 is to be inserted here]

Next, we estimate equation (2) and add HHI into X_{mijkt}. The results are reported in Table 7. Again, our estimation results remain largely the same when HHI is included in the model, except for a small increase in the coefficients for $WAGE$. This also causes the marginal impact of $WAGE$ on the cost of corruption to become less negative. As a consequence, the level of income per capita below which the marginal effect is significant (see Figure 2) at the 10% level is 5,047 dollars. For

[9] Some authors have argued that the Herfindahl-Hirschman index may not be a good measure of competition (see, for instance, Bikker and Haaf, 2002). We have therefore also used markups as an alternative measure of competition. In that case, the main results of our models as well as our empirical conclusions remain unchanged. However, the number of observations drops by almost a half due to missing data in sales and operating costs, which are necessary to compute the markups. The results are available on request.

the case of the cost of red tape, the marginal impact of $WAGE$ is significant at the 5% level for per capita incomes of 16,069 dollars or lower. The coefficient of HHI is negative in both cases, but is only significantly different from zero in the regression for the actual cost of corruption.

[Table 7 is to be inserted here]

5. Conclusions

In this paper we have used a large sample of firms from all over the world to examine the relationship between inter-industry wage differentials and corruption and red tape. Corruptible bureaucrats in relatively low-income countries may not have precise information about firms' ability to pay bribes. Therefore, they may use information on the average wage level of the industry in which the firm operates as an indicator, and 'rattle' firms in high-wage industries by more burdensome red tape to extract petty bribes. For this reason, firms in high-wage industries in poor countries may have worse perceptions of government corruption and government regulations, suffer from more red tape, and spend more on bribery. Although the inter-industry wage structure is relatively stable across countries (and over time), high-wage firms in relatively rich countries may not suffer from such discrimination. This is because petty corruption is not common in countries with relatively high-income levels and firms may have enough financial resources to meet costly government regulations.

Based on a sample of 43,568 firms and controlling for country as well as firm characteristics, we find significant evidence that firms from high-wage industries in relatively poor countries complain more about red tape and corruption. This supports our hypothesis that corruptible bureaucrats in low-income countries use information on inter-industry wage differentials as an indicator of the possibility of extracting bribes.

We find similar results for the relationship between inter-industry wage differentials and the reported amount of money spent on corruption (measured as the percentage of annual sales spent on bribes) and the cost of red tape (measured as the percentage of senior management time spent on government regulation). When income per capita is less than 6,121 dollars, firms in industries with a higher average wage have to pay more gifts and informal payments "to get things done". When income is less than 12,785 dollars, senior management in industries with a higher

average wage spends a significantly larger share of their time on dealing with government regulations.

Our findings on the relationship between inter-industry wage differentials, corruption and red tape are robust, even when we control for the possible alternative explanation of the variation in the top managers' perception of corruption, such as the level of concentration at the ISIC 3 2-digit industry level.

Our findings shed new light on the nature of corruption in developing countries. Anti-corruption policy should take account of the fact that—for the extraction of bribes— corruptible bureaucrats discriminate firms according to average wage level of the firm's industry. Monitoring, detection and punishment of corruption should be focused on bureaucrats responsible for regulating high-wage industries.

Tables

Table 1. The definitions of the dependent variables

Variables	Definition
Actual cost measures	
Senior Time	In a typical week over the last 12 months, what percentage of total senior management's time was spent in dealing with requirements imposed by government regulations? [By senior management I mean managers, directors, and officers above direct supervisors of production/sales workers. Some examples of government regulations are taxes, customs, labor regulations, licensing and registration, including dealings with officials and completing forms]
Bribery Expenditure	The percentage of revenue the respondent indicated to have been paid when asked the question "We've heard that establishments are sometimes required to make gifts or informal payments to public officials to "get things done" with regard to customs, taxes, licenses, regulations, services etc. On average, what percent of total annual sales, or estimated total annual value, do establishments like this one pay in informal payments or gifts to public officials for this purpose?"
Perception measures	
Corruption	Answer to the question "Do you think that corruption is No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment?"
Courts/Legal System	Answer to the question "Do you think that the legal system is No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment?"
Business Licensing & Operating Permits	Answer to the question "Do you think that the business licensing and operating permits are No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment?"
Labor Regulation	Answer to the question "Do you think that labor regulations are No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment?"
Tax Administration	Answer to the question "Do you think that the tax administration is No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment?"

Table 2. Summary of the main variables

Variable	Obs	Mean	Standard Deviation	Min	Max
1. WAGE	43,568	1.49	0.38	0.20	3.16
2. INCOME	43,568	9.24	0.67	7.28	10.72
3. WAGE x INCOME	43,568	13.78	3.59	1.65	31.11
4. Labor Regulation	42,842	1.19	1.21	0	4
5. Legal System	39,470	1.22	1.28	0	4
6. License and Permit	41,913	1.12	1.19	0	4
7. Tax Administration	42,639	1.52	1.25	0	4
8. Senior time	40,492	10.18	15.73	0	100
9. Corruption	41,184	1.55	1.41	0	4
10. Bribery Expenditure	7,952	3.99	6.44	0.001	100
11. FIRM AGE	43,568	0.18	0.18	0	3.1
12. EXPORTER	43,568	0.23	0.42	0	1
13. OWNERSHIP1	43,568	0.13	0.33	0	1
14. OWNERSHIP2	43,568	0.05	0.21	0	1
15. LEGAL1	43,568	0.50	0.50	0	1
16. LEGAL2	43,568	0.07	0.26	0	1
17. LEGAL3	43,568	0.23	0.42	0	1
18. SMALL	43,568	0.49	0.50	0	1
19. MEDIUM	43,568	0.30	0.46	0	1
20. LOCATION1	43,568	0.18	0.39	0	1
21. LOCATION2	43,568	0.13	0.34	0	1
22. LOCATION3	43,568	0.31	0.46	0	1

Table 3. Correlation matrix of the main variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. WAGE	1																				
2. INCOME	-0.02	1																			
3. WAGE x INCOME	0.96	0.24	1																		
4. Labor Regulation	0.10	0.09	0.12	1																	
5. Legal System	0.05	-0.05	0.04	0.40	1																
6. License and Permit	0.05	-0.05	0.05	0.40	0.44	1															
7. Tax Administration	0.03	-0.01	0.03	0.43	0.43	0.46	1														
8. Senior time	0.04	-0.05	0.03	0.14	0.18	0.13	0.12	1													
9. Corruption	0.11	-0.15	0.07	0.35	0.62	0.42	0.44	0.18	1												
10. Bribery Expenditure	0.06	-0.09	0.03	0.05	0.08	0.05	0.04	0.18	0.16	1											
11. FIRM AGE	0.04	0.08	0.06	0.09	0.04	-0.003	-0.003	0.058	-0.0004	-0.01	1										
12. EXPORTER	-0.02	0.06	-0.004	0.08	0.05	0.02	0.02	0.05	0.002	-0.05	0.15	1									
13. OWNERSHIP1	-0.04	-0.04	-0.05	0.01	0.00	0.01	-0.02	0.02	-0.03	-0.04	-0.01	0.25	1								
14. OWNERSHIP2	-0.13	-0.08	-0.14	-0.05	-0.03	-0.05	-0.05	-0.02	-0.07	-0.05	0.18	0.01	-0.04	1							
15. LEGAL1	0.10	0.08	0.12	0.16	0.10	0.10	0.07	0.11	0.13	0.06	0.05	0.12	0.06	-0.22	1						
16. LEGAL2	-0.04	-0.01	-0.04	-0.02	0.03	0.0007	-0.03	0.06	-0.002	0.02	0.19	0.06	0.03	0.34	-0.27	1					
17. LEGAL3	-0.0002	-0.04	-0.01	-0.13	-0.09	-0.08	-0.05	-0.11	-0.08	0.02	-0.16	-0.16	-0.13	-0.12	-0.54	-0.15	1				
18. SMALL	-0.01	0.09	0.01	-0.17	-0.10	-0.08	-0.04	-0.15	-0.09	0.01	-0.25	-0.28	-0.17	-0.10	-0.24	-0.17	0.34	1			
19. MEDIUM	0.03	-0.05	0.02	0.09	0.06	0.04	0.04	0.09	0.08	0.03	0.03	0.05	0.005	-0.001	0.17	0.03	-0.17	-0.64	1		
20. LOCATION1	0.04	-0.01	0.04	-0.01	-0.02	-0.02	-0.01	0.01	0.02	0.02	-0.01	-0.02	-0.03	-0.02	0.03	0.001	0.01	-0.02	0.03	1	
21. LOCATION2	0.007	-0.18	-0.04	0.05	0.01	0.02	0.01	0.03	0.03	-0.03	0.02	-0.001	0.03	0.03	0.0003	-0.01	-0.04	-0.11	0.04	-0.18	1
22. LOCATION3	0.01	-0.07	-0.003	0.02	0.04	0.04	0.01	0.04	0.05	0.07	0.04	0.03	0.07	-0.003	0.07	0.02	-0.07	-0.03	0.003	-0.32	-0.26

Table 4. The impact of inter-industry wage differentials on the top managers' perception of corruption and red tape

Dependent Variable	MAJOR OBSTACLE TO FIRMS' OPERATION				
	Corruption	**Legal System**	**Labor Regulation**	**Operating License**	**Tax Administration**
(1)	(2)	(6)	(3)	(4)	(5)
WAGE	-1.07***	-0.80**	-1.64***	-1.24***	-1.41***
	(0.37)	(0.31)	(0.39)	(0.46)	(0.26)
WAGE x INCOME	0.11***	0.08**	0.17***	0.13***	0.16***
	(0.04)	(0.03)	(0.04)	(0.05)	(0.03)
FIRM AGE	-0.06	0.07*	0.02	-0.13***	-0.04
	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)
EXPORTER	0.02	0.05***	0.09***	0.04**	0.07***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
OWNERSHIP1	-0.05**	-0.02	-0.03	0.03	-0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
OWNERSHIP2	-0.22***	-0.17***	-0.11**	-0.21***	-0.25***
	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)
LEGAL1	0.02	0.003	-0.01	0.01	0.0003
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
LEGAL2	-0.01	0.02	-0.06*	0.01	-0.004
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
LEGAL3	-0.03	-0.08***	-0.06**	-0.04**	-0.01
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
SMALL	0.06**	-0.09***	-0.25***	-0.08***	-0.03
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
MEDIUM	0.07***	-0.01	-0.07***	-0.03*	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
LOCATION1	0.04	0.01	0.02	0.02	0.04
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
LOCATION2	-0.00	0.01	-0.01	0.07	0.03
	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)
LOCATION3	0.10***	0.08***	0.01	0.07***	0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	41,184	39,470	42,842	41,913	42,639
No. of surveys	104	104	104	104	104
No. of Countries	52	52	52	52	52
Psudo-Rsquared	0.08	0.07	0.09	0.04	0.08

This Table presents the estimation of equation (5.1) using the ordered probit model. The name of the column is also the name of the dependent variable. The standard errors reported in the parentheses are corrected for within country-year clustered effects. 104 country-year dummies are included. *,**,*** indicate the significant level of 10%, 5% and 1%, respectively.

Table 5. The impact of inter-industry wage differentials on the top managers' reports on the actual costs of corruption and red tape

Dependent Variable	CORRUPTION COST		RED TAPE COST	
	LL=0	**LL=0, UL=10.01**	**LL=0**	**LL=0, UL=50.01**
(1)	(2)	(3)	(4)	(5)
WAGE	-4.46*	-3.10*	-14.39**	-12.40**
	(2.52)	(1.80)	(7.10)	(6.05)
WAGE x INCOME	0.44*	0.30	1.33*	1.15*
	(0.27)	(0.19)	(0.77)	(0.66)
FIRM AGE	-1.48***	-1.01***	0.66	0.70
	(0.51)	(0.29)	(0.69)	(0.58)
EXPORTER	0.24	0.15	0.79**	0.76***
	(0.22)	(0.15)	(0.34)	(0.29)
OWNERSHIP1	-0.74***	-0.56***	0.18	0.12
	(0.20)	(0.14)	(0.38)	(0.32)
OWNERSHIP2	-2.61***	-1.86***	0.18	0.40
	(0.66)	(0.46)	(0.60)	(0.54)
LEGAL1	0.13	0.12	-0.02	0.07
	(0.31)	(0.20)	(0.43)	(0.37)
LEGAL2	-0.17	-0.24	1.33**	1.11**
	(0.46)	(0.30)	(0.63)	(0.53)
LEGAL3	-0.51*	-0.28	-2.16***	-1.81***
	(0.30)	(0.21)	(0.55)	(0.47)
SMALL	1.34***	0.94***	-2.88***	-2.49***
	(0.37)	(0.25)	(0.73)	(0.62)
MEDIUM	0.96***	0.65***	0.02	0.07
	(0.28)	(0.18)	(0.39)	(0.35)
LOCATION1	0.17	0.17	0.70	0.66
	(0.46)	(0.32)	(0.64)	(0.56)
LOCATION2	0.53	0.44	-1.01**	-0.77*
	(0.55)	(0.39)	(0.48)	(0.42)
LOCATION3	0.74**	0.40*	-0.41	-0.21
	(0.34)	(0.22)	(0.57)	(0.48)
Constant	1.63***	2.34***	17.66***	16.66***
	(0.58)	(0.37)	(1.36)	(1.14)
Uncensored observations	7,952	7,604	27,055	27,055
Left-censored observations	20,348	20,348	13,527	12,436
Right-censored observations	0	348	0	991
No. of surveys	104	104	104	104
No. of Countries	52	52	52	52
(PSUDO-) R-squared	0.07	0.08	0.03	0.04

This Table presents the estimation of equation (5.2) using the Tobit model. The name of the column is also the name of the dependent variable. The standard errors reported in the parentheses are corrected for within country-year clustered effects. 104 country-times-year dummies are included. *,**,*** indicate the significant level of 10%, 5% and 1%, respectively.

Table 6. The impact of inter-industry wage differentials on the top managers' perception of corruption and red tape with industry concentration as additional control variable

Dependent Variables	MAJOR OBSTACLE TO FIRMS' OPERATION				
	Corruption	**Legal System**	**Labor Regulation**	**Operating License**	**Tax Administration**
(1)	(2)	(3)	(4)	(5)	(6)
WAGE	-1.08***	-0.81**	-1.63***	-1.24***	-1.41***
	(0.37)	(0.32)	(0.38)	(0.46)	(0.26)
WAGE x INCOME	0.11***	0.08**	0.17***	0.13***	0.15***
	(0.04)	(0.03)	(0.04)	(0.05)	(0.03)
FIRM AGE	-0.06	0.07*	0.02	-0.13***	-0.04
	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)
EXPORTER	0.02	0.05***	0.08***	0.04**	0.07***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
OWNERSHIP1	-0.05**	-0.02	-0.03	0.03	-0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
OWNERSHIP2	-0.22***	-0.17***	-0.11**	-0.21***	-0.25***
	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)
LEGAL1	0.02	0.003	-0.01	0.01	0.0004
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
LEGAL2	-0.01	0.02	-0.06*	0.01	-0.004
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
LEGAL3	-0.03	-0.08***	-0.06**	-0.04**	-0.01
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
SMALL	0.06**	-0.09***	-0.25***	-0.08***	-0.03
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
MEDIUM	0.07***	-0.01	-0.07***	-0.03*	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
LOCATION1	0.04	0.01	0.02	0.02	0.04
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
LOCATION2	-0.00	0.01	-0.01	0.07	0.03
	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)
LOCATION3	0.10***	0.08***	0.01	0.07***	0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
HHI	0.01	0.02	-0.04**	0.02	-0.002
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	41,184	39,470	42,842	41,913	42,639
No. of surveys	104	104	104	104	104
No. of countries	52	52	52	52	52
Psudo-Rsquared	0.08	0.07	0.09	0.04	0.08

This Table presents the estimation of equation (5.1) with the HHI index as an additional control variable, using the Ordered Probit model. The name of the column is also the name of the dependent variable. The standard errors reported in the parentheses are corrected for country-year clustered effects. 104 country-times-year dummies are included. *,**,*** indicate the significant level of 10%, 5% and 1%, respectively.

Table 7. The impact of inter-industry wage differentials on the top managers' reports on the costs of corruption and red tape with industry concentration as additional control variable

INDEPENDENT VARIABLES	CORRUPTION COST		SENIOR TIME	
	LL = 0, UL = 10.1		LL =0, UL = 50.1	
	Estimates	Standard Errors	Estimates	Standard Errors
(1)	(4)	(5)	(2)	(3)
WAGE	-2.87*	(1.68)	-12.31*	(7.01)
WAGE x INCOME	0.29	(0.18)	1.15	(0.77)
FIRM AGE	-1.02***	(0.29)	0.69	(0.55)
EXPORTER	0.11	(0.14)	0.73***	(0.27)
OWNERSHIP1	-0.55***	(0.14)	0.12	(0.30)
OWNERSHIP2	-1.88***	(0.46)	0.39	(0.53)
LEGAL1	0.11	(0.20)	0.07	(0.32)
LEGAL2	-0.24	(0.30)	1.10**	(0.47)
LEGAL3	-0.28	(0.21)	-1.82***	(0.40)
SMALL	0.96***	(0.25)	-2.48***	(0.52)
MEDIUM	0.65***	(0.18)	0.08	(0.32)
LOCATION1	0.17	(0.32)	0.67	(0.49)
LOCATION2	0.44	(0.39)	-0.78**	(0.35)
LOCATION3	0.41*	(0.22)	-0.20	(0.39)
HHI	-0.53**	(0.21)	-0.31	(0.35)
Constant	2.44***	(0.38)	16.69***	(1.54)
Uncensored observations	7,604		27,065	
Left-censored observations	20,348		12,436	
Right-censored observations	348		991	
No. of surveys	104		104	
No. of Countries	52		52	
(PSUDO-) R-squared	0.11		0.04	

Notes: This table presents the estimation of equation (5.2) with the HHI index as an additional control variable. The name of the column is also the name of the dependent variable. The standard errors reported in the parentheses are corrected for within country-year clustered effects. *,**,*** indicate the significant level of 10%, 5% and 1%, respectively.

Figures

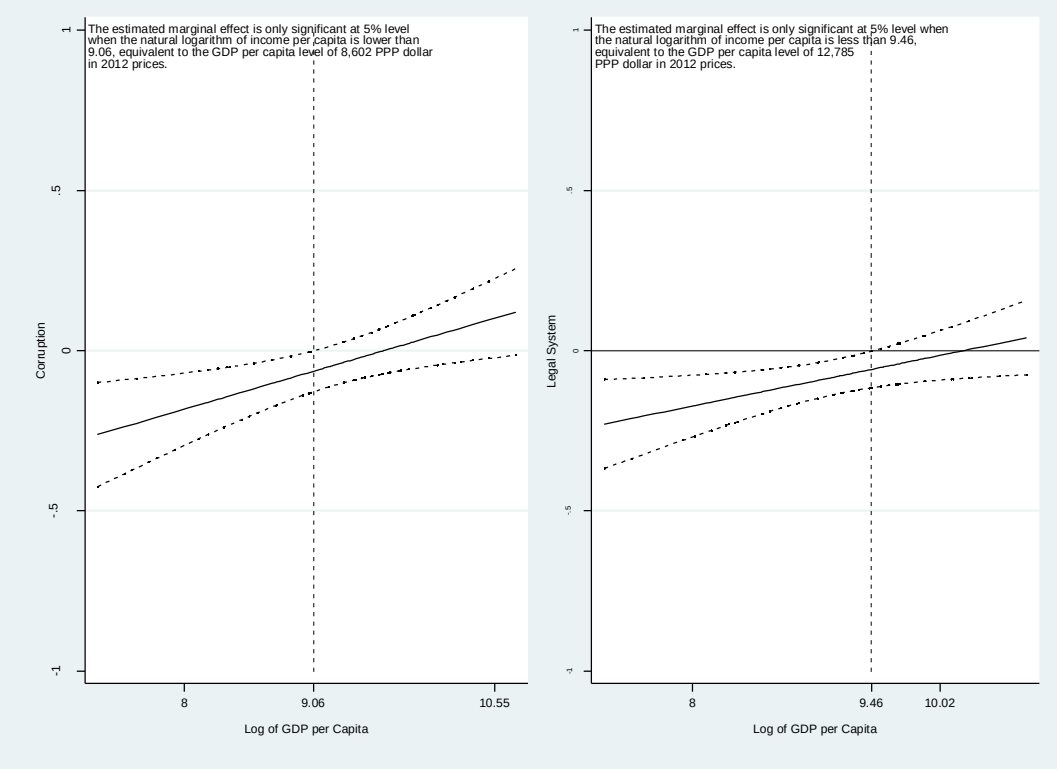

Figure 1. The marginal impact of inter-industry wage differentials on top managers' perception of corruption and red tape

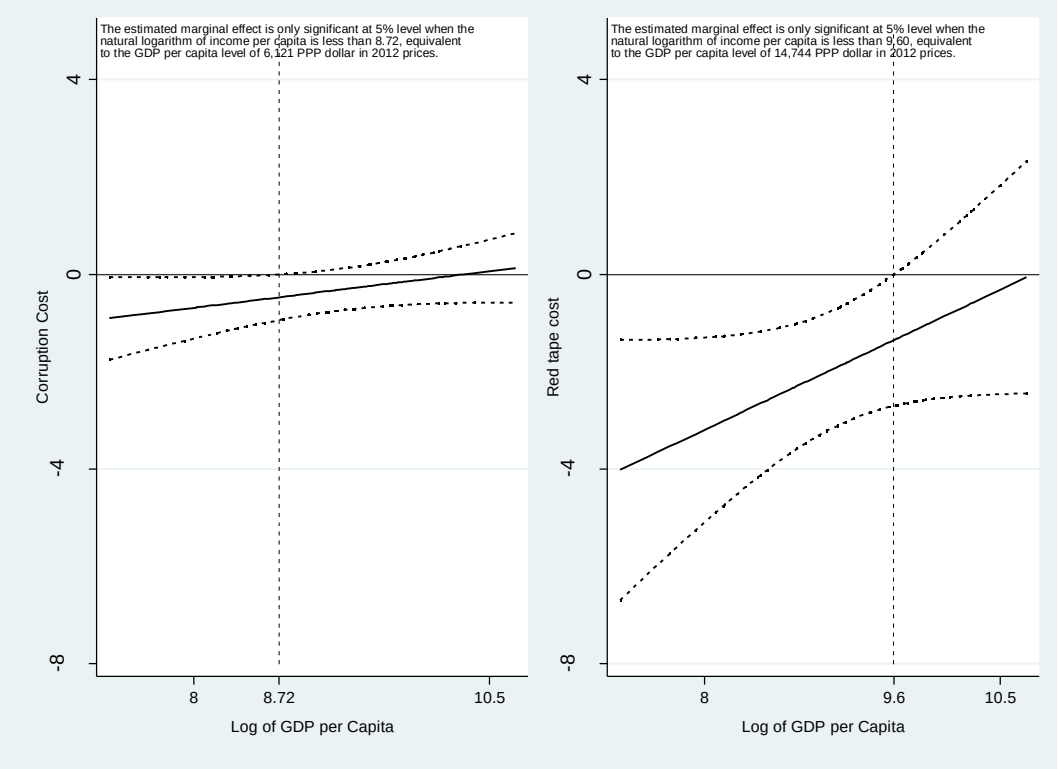

Figure 2. The marginal impact of inter-industry wage differentials on top managers' reports on the costs of corruption and red tape

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Appendix A. List of countries and years included in this analysis

Country	Year	Number of firms	Country	Year	Number of firms
Albania	2002	136	Kyrgyzstan	2002	172
Albania	2005	166	Kyrgyzstan	2003	102
Argentina	2010	1042	Kyrgyzstan	2005	202
Armenia	2002	170	Latvia	2002	172
Armenia	2005	351	Latvia	2005	205
Armenia	2009	369	Latvia	2009	269
Azerbijan	2002	170	Lithuania	2002	199
Azerbijan	2005	349	Lithuania	2004	229
Azerbijan	2009	350	Lithuania	2005	205
Bosnia & Herzgovina	2002	145	Lithuania	2009	269
Brazil	2003	1634	Macedonia	2002	170
Brazil	2009	1113	Macedonia	2005	200
Bulgaria	2002	247	Macedonia	2009	351
Bulgaria	2004	517	Mauritius	2009	353
Bulgaria	2005	300	Moldova	2002	174
Bulgaria	2007	1015	Moldova	2003	103
Bulgaria	2009	270	Moldova	2005	350
Chile	2010	1027	Moldova	2009	362
China	2002	1442	Mongolia	2009	359
Colombia	2010	900	Montenegro	2009	115
Costa Rica	2005	338	Nicaragua	2010	287
Costa Rica	2010	514	Panama	2010	346
Croatia	2002	176	Paraguay	2010	359
Croatia	2005	232	Peru	2010	991
Croatia	2007	520	Philippines	2009	1293
Czech Republic	2002	264	Poland	2002	497
Czech Republic	2005	338	Poland	2003	108
Czech Republic	2009	215	Poland	2005	974
Dominican Republic	2005	109	Poland	2009	385
Dominican Republic	2010	341	Portugal	2005	503
Ecuador	2010	352	Romania	2002	254
El Salvadar	2003	175	Romania	2005	600
El Salvadar	2010	328	Romania	2009	491
Estonia	2002	169	Russian Federation	2005	600
Estonia	2005	219	Russian Federation	2009	975
Estonia	2009	270	Serbia	2002	182
Georgia	2002	174	Serbia	2005	300
Georgia	2005	200	Serbia	2009	384
Georgia	2008	365	Slovakia	2002	162
Germany	2005	1186	Slovakia	2005	215
Greece	2005	541	Slovakia	2009	236
Guatemala	2003	109	Slovenia	2002	186
Honduras	2003	163	Slovenia	2005	221
Honduras	2010	320	Slovenia	2009	272
Hungary	2002	247	South Africa	2003	182
Hungary	2005	608	South Africa	2007	874
Hungary	2009	288	Spain	2005	601
Indonesia	2009	1387	Tajikistan	2003	106
Ireland	2005	491	Ukraine	2002	453
Kazakhstan	2002	247	Ukraine	2005	593
Kazakhstan	2005	585	Ukraine	2008	801
Kazakhstan	2009	531	Uruguay	2010	569
			Venezuela	2010	292

Appendix B. Marginal impact of WAGE on the top managers' perception of labor regulation, business licensing and operation permits, and tax administration.